Vorlesung Mensch-Maschine-Interaktion

Ludwig-Maximilians-Universität München

LFE Medieninformatik

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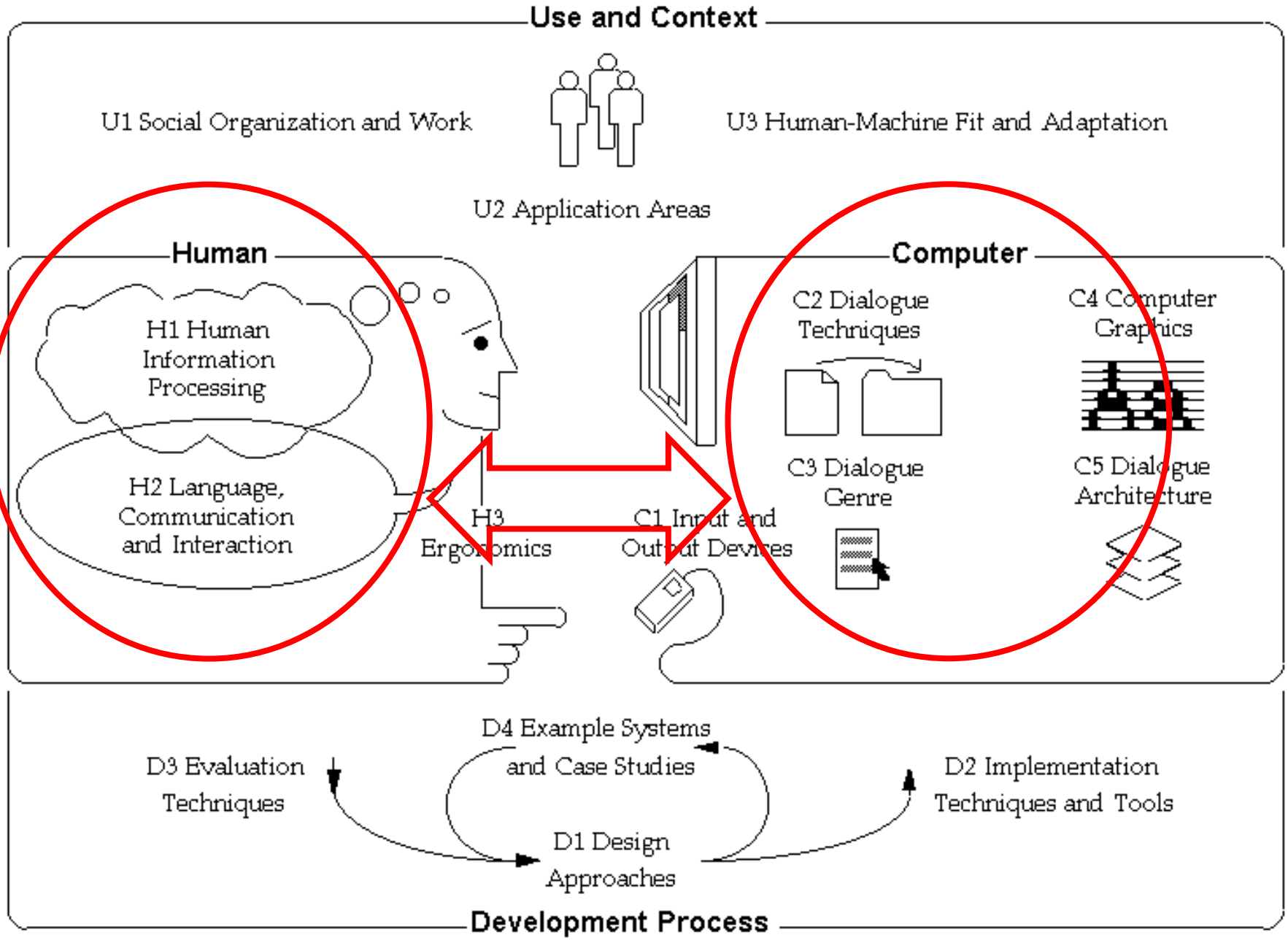
WS2004/2005

http://www.medien.ifi.lmu.de/



from ACM SIGCHI Curricula for HCI

How to get a Conceptual Model? Options for Model in HCI

- Activity based
  - Giving instructions
    - issuing commands using keyboard and function keys and selecting options via menus
  - Conversing
    - interacting with the system as if having a conversation
  - Manipulating and navigating
    - acting on objects and interacting with virtual objects
  - Exploring and browsing
    - finding out and learning things

- Based on (physical) objects or artefacts, e.g.
  - Office equipment
  - Tool
  - Book

Giving instructions

- Where users instruct the system and tell it what to do
  - e.g. tell the time, print a file, save a file
- Very common conceptual model, underlying a diversity of devices and systems
  - e.g. Unix shells, CAD, word processors, DVD player, vending machines
- Main benefit is that instructing supports quick and efficient interaction
  - good for repetitive kinds of actions performed on multiple objects

Conversing

- Underlying model of having a conversation with another human
- Range from simple voice recognition menu-driven systems to more complex ‘natural language’ dialogues
- Examples include timetables, search engines, advice-giving systems, help systems
- Recently, much interest in having virtual agents at the interface, who converse with you, e.g. Microsoft’s Agents (e.g. Clippy)

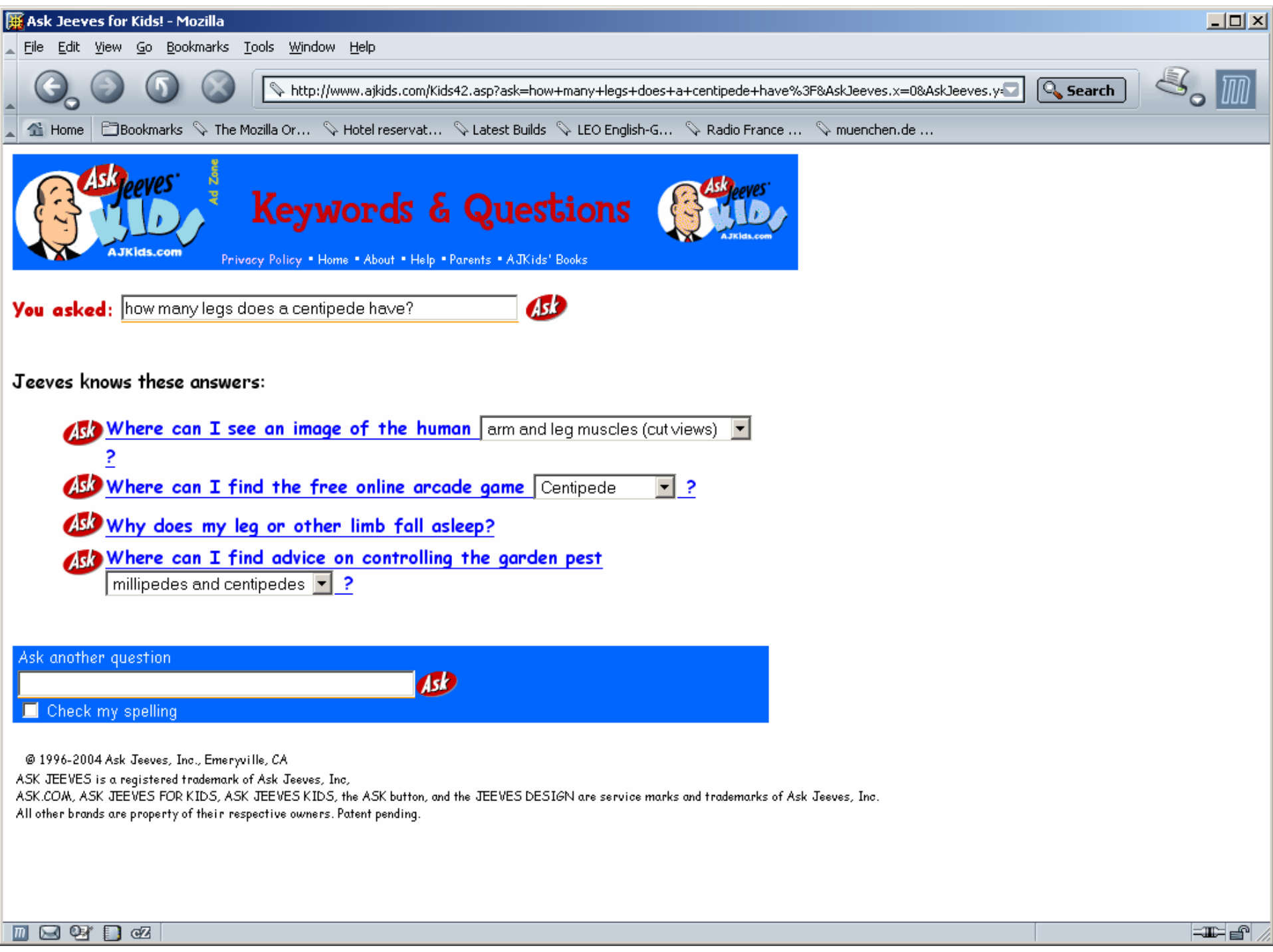
Pros and cons of conversational model

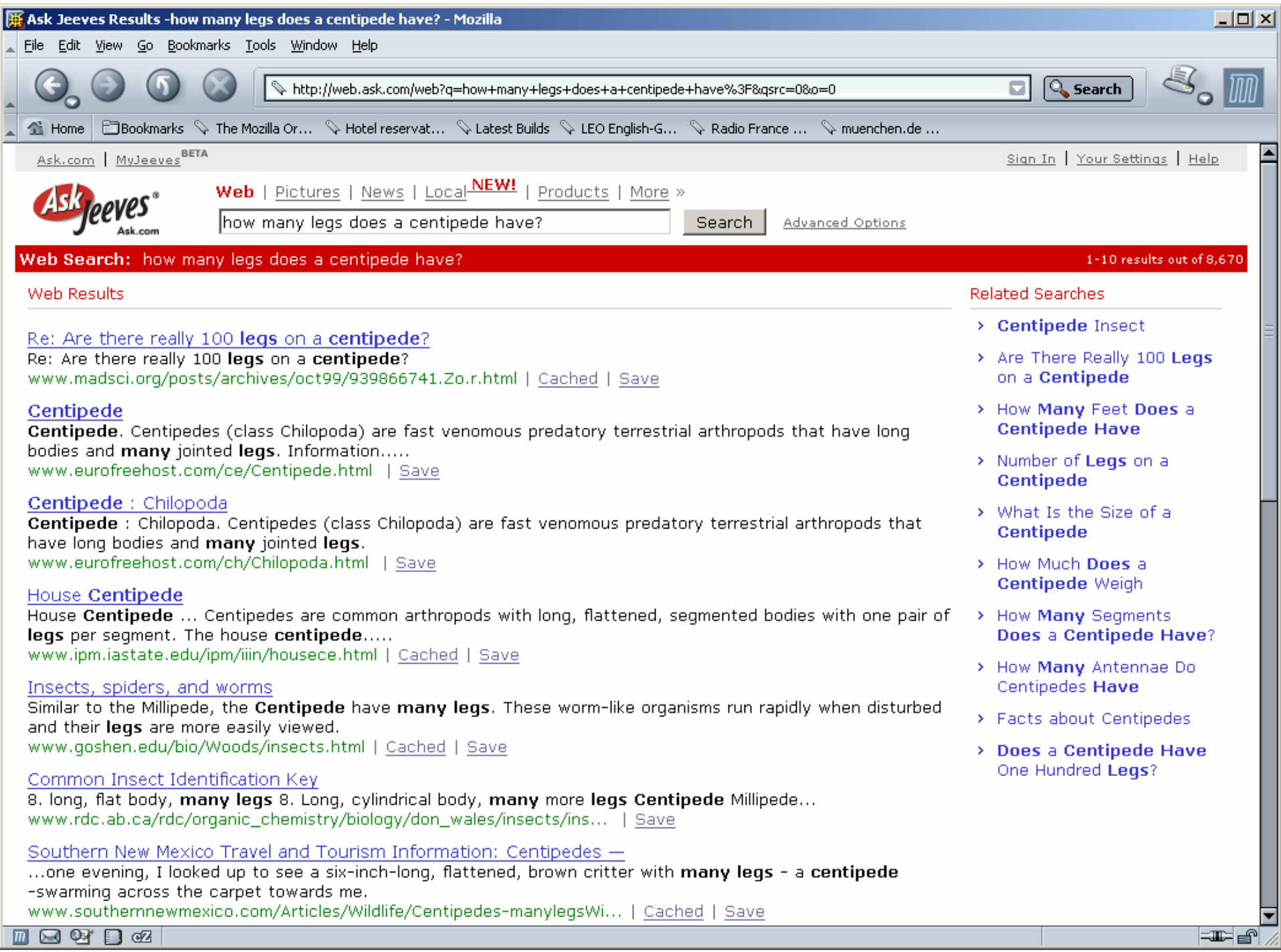
- Allows users, especially novices and technophobes, to interact with the system in a way that is familiar
  - makes them feel comfortable, at ease and less scared

- Misunderstandings can arise when the system does not know how to parse what the user says
  - e.g. child types into a search engine, that uses natural language (http://www.ask.com/) the question:

  "How many legs does a centipede have?"

  and the system responds:


Ask Jeeves for Kids! - Mozilla
File Edit View Go Bookmarks Tools Window Help
http://www.ajkids.com/Kids42.asp?ask=how+many+legs+does+a+centipede+have%3F&AskJeeves.x=0&AskJeeves.y=
Search
Home Bookmarks The Mozilla Or... Hotel reservat... Latest Builds LEO English-G... Radio France ... muenchen.de ...
Ask Jeeves KIDS
AJKids.com
Ad Zone
Keywords & Questions
Privacy Policy • Home • About • Help • Parents • AJKids' Books
You asked: how many legs does a centipede have? Ask
Jeeves knows these answers:
Where can I see an image of the human arm and leg muscles (cut views) ?
Where can I find the free online arcade game Centipede ?
Why does my leg or other limb fall asleep?
Where can I find advice on controlling the garden pest millipedes and centipedes ?
Ask another question
Ask
Check my spelling
© 1996-2004 Ask Jeeves, Inc., Emeryville, CA
ASK JEEVES is a registered trademark of Ask Jeeves, Inc,
ASK.COM, ASK JEEVES FOR KIDS, ASK JEEVES KIDS, the ASK button, and the JEEVES DESIGN are service marks and trademarks of Ask Jeeves, Inc.
All other brands are property of their respective owners. Patent pending.


Ask Jeeves Results -how many legs does a centipede have? - Mozilla
File Edit View Go Bookmarks Tools Window Help
http://web.ask.com/web?q=how+many+legs+does+a+centipede+have%3F&qsrc=0&o=0
Search
Home Bookmarks The Mozilla Or... Hotel reservat... Latest Builds LEO English-G... Radio France ... muenchen.de ...
Ask.com | MyJeeves BETA
Sign In | Your Settings | Help
Ask Jeeves Ask.com
Web | Pictures | News | Local NEW! | Products | More »
how many legs does a centipede have?
Search
Advanced Options
Web Search: how many legs does a centipede have?
1-10 results out of 8,670
Web Results
Re: Are there really 100 legs on a centipede?
Re: Are there really 100 legs on a centipede?
www.madsci.org/posts/archives/oct99/939866741.Zo.r.html | Cached | Save
Centipede
Centipede. Centipedes (class Chilopoda) are fast venomous predatory terrestrial arthropods that have long bodies and many jointed legs. Information.....
www.eurofreehost.com/ce/Centipede.html | Save
Centipede : Chilopoda
Centipede : Chilopoda. Centipedes (class Chilopoda) are fast venomous predatory terrestrial arthropods that have long bodies and many jointed legs.
www.eurofreehost.com/ch/Chilopoda.html | Save
House Centipede
House Centipede ... Centipedes are common arthropods with long, flattened, segmented bodies with one pair of legs per segment. The house centipede.....
www.ipm.iastate.edu/ipm/iiin/housece.html | Cached | Save
Insects, spiders, and worms
Similar to the Millipede, the Centipede have many legs. These worm-like organisms run rapidly when disturbed and their legs are more easily viewed.
www.goshen.edu/bio/Woods/insects.html | Cached | Save
Common Insect Identification Key
8. long, flat body, many legs 8. Long, cylindrical body, many more legs Centipede Millipede...
www.rdc.ab.ca/rdc/organic_chemistry/biology/don_wales/insects/ins... | Save
Southern New Mexico Travel and Tourism Information: Centipedes —
...one evening, I looked up to see a six-inch-long, flattened, brown critter with many legs - a centipede -swarming across the carpet towards me.
www.southernnewmexico.com/Articles/Wildlife/Centipedes-manylegsWi... | Cached | Save
Related Searches
Centipede Insect
Are There Really 100 Legs on a Centipede
How Many Feet Does a Centipede Have
Number of Legs on a Centipede
What Is the Size of a Centipede
How Much Does a Centipede Weigh
How Many Segments Does a Centipede Have?
How Many Antennae Do Centipedes Have
Facts about Centipedes
Does a Centipede Have One Hundred Legs?

Manipulating and Navigating

- Involves dragging, selecting, opening, closing and zooming actions on virtual objects
- Exploits users' knowledge of how they move and manipulate in the physical world
- Examples
  - what you see is what you get (WYSIWYG)
  - the direct manipulation approach (DM)

- Shneiderman (1983) coined the term DM, came from his fascination with computer games at the time
- Common model in the desktop world

Core principles of DM

- Continuous representation of objects and actions of interest
- Physical actions and button pressing instead of issuing commands with complex syntax
- Rapid reversible actions with immediate feedback on object of interest

Why are DM interfaces so enjoyable?

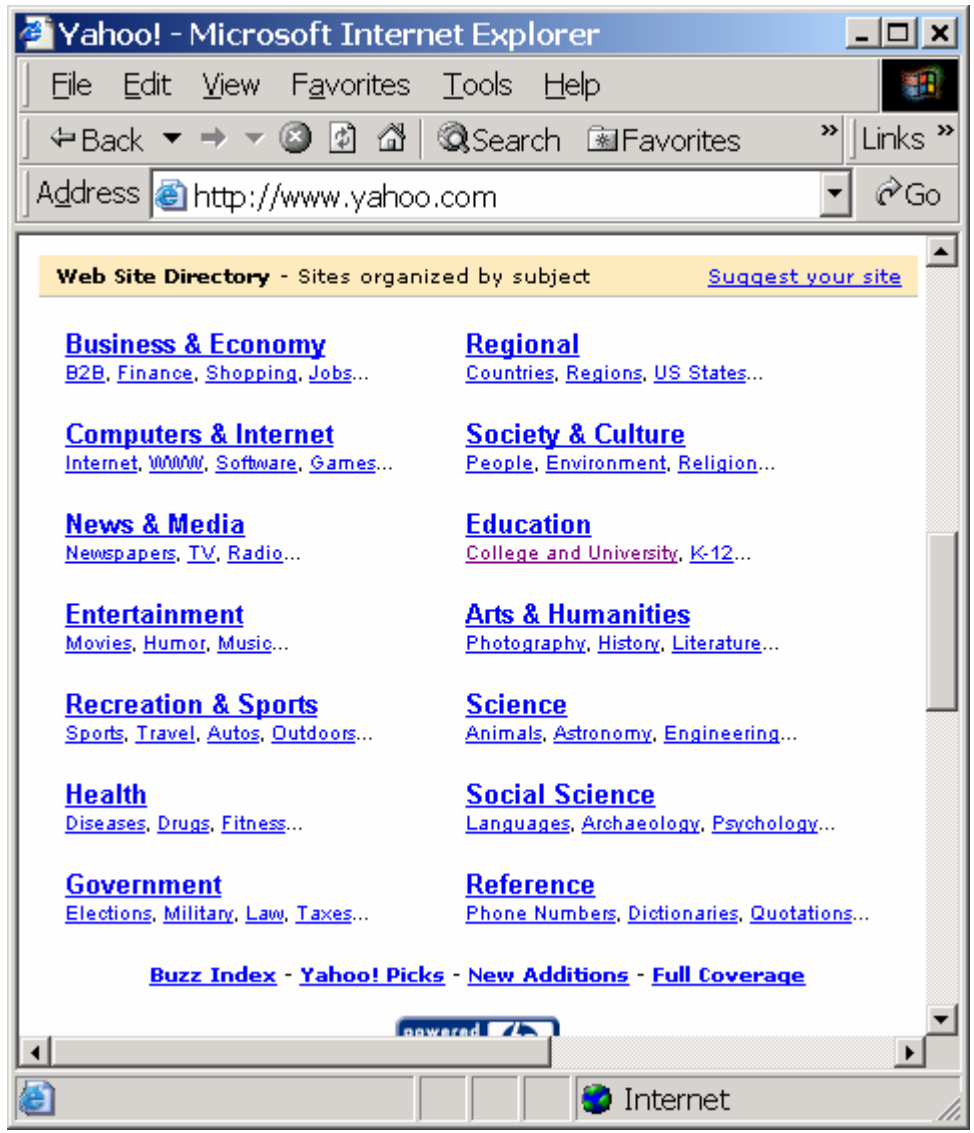
- Novices can learn the basic functionality quickly
- Experienced users can work extremely rapidly to carry out a wide range of tasks, even defining new functions
- Intermittent users can retain operational concepts over time
- Error messages rarely needed
- Users can immediately see if their actions are furthering their goals and if not do something else
- Users experience less anxiety
- Users gain confidence and mastery and feel in control

What are the disadvantages with DM?

- Some people take the metaphor of direct manipulation too literally
- Not all tasks can be described by objects and not all actions can be done directly
- Some tasks are better achieved through delegating
  - e.g. spell checking
- Can waste extensive screen space
- Moving a mouse around the screen can be slower than pressing function keys to do same actions

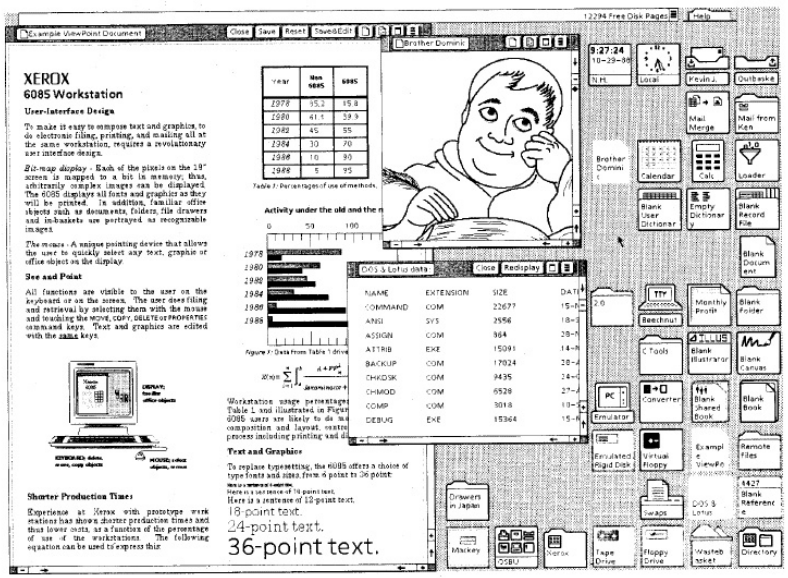
Exploring and browsing

- Similar to how people browse information with existing media (e.g. newspapers, magazines, libraries)
- Information is structured to allow flexibility in the way user is able to search for information
  - e.g. multimedia, web

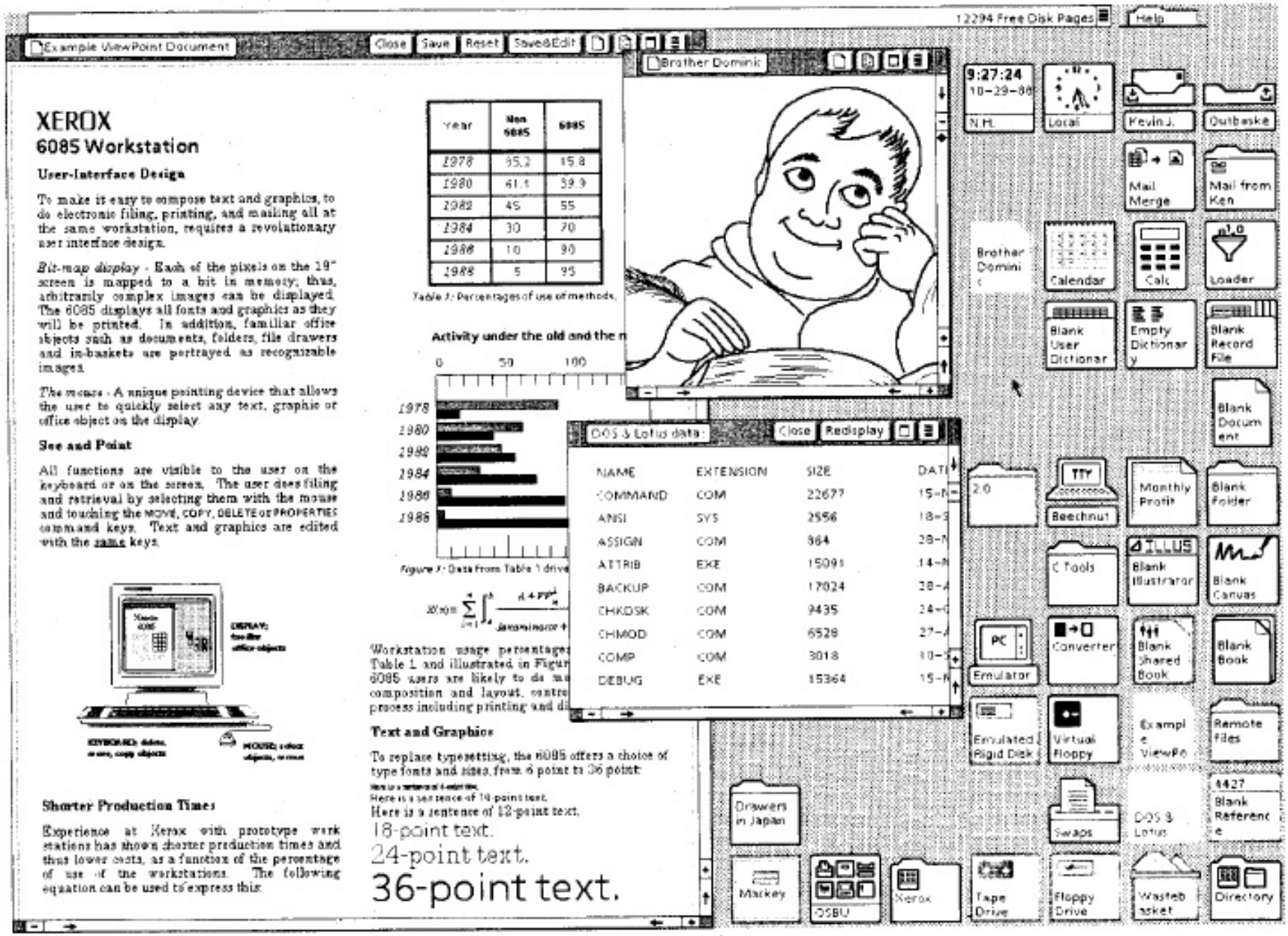


Conceptual models based on objects

- Usually based on an analogy with something in the physical world
- Examples include books, tools, vehicles
- Classic: Star Interface based on office objects



Johnson et al (1989)



Johnson et al (1989)

Which conceptual model is best?

- Direct manipulation is good for ‘doing’ types of tasks, e.g. designing, drawing, flying, driving, sizing windows
- Issuing instructions is good for repetitive tasks, e.g. spell-checking, file management
- Having a conversation is good for children, computer-phobic, disabled users and specialised applications (e.g. phone services)
- Exploring and browsing is good if the task is explorative

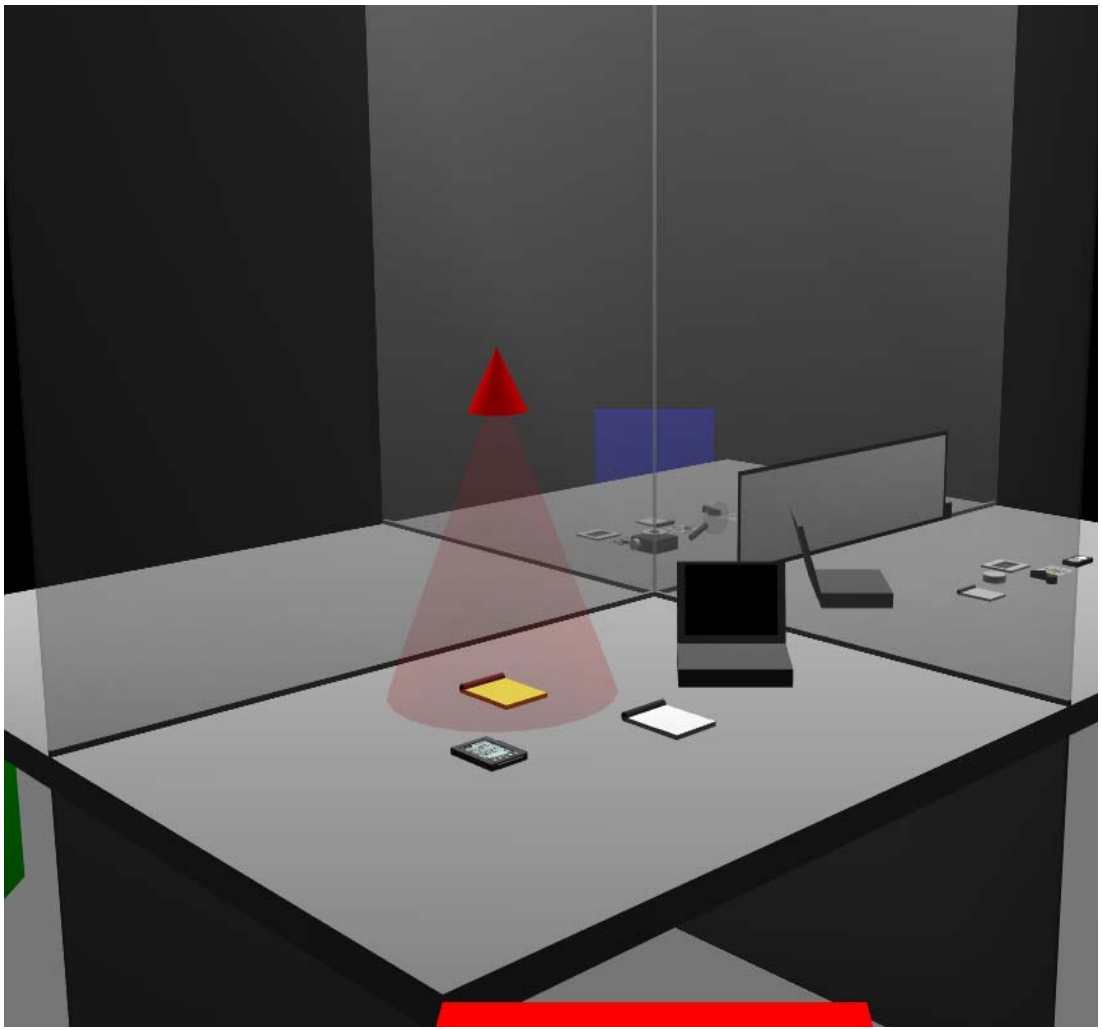
- Hybrid conceptual models are often employed, where **different ways of carrying out the same actions are supported at the interface**
  - Toolbar, Menus and Keyboard short cut offer same function
  - Can replace *Expert-Mode* and *Novice-Mode* in the UI

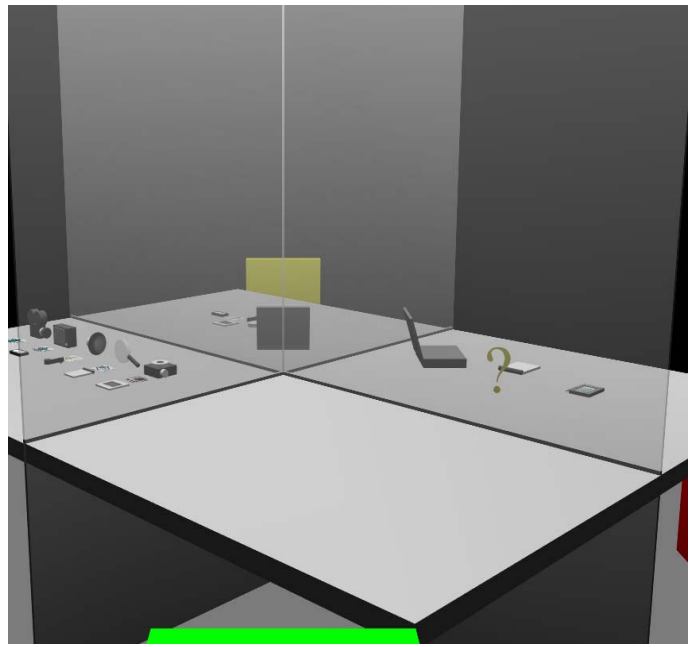
Interface Metaphors

- Interface designed to be similar to a physical entity but also has own properties
  - e.g. desktop metaphor, web portals
- Can be based on activity, object or a combination of both
- Exploit user's familiar knowledge, helping them to understand 'the unfamiliar'

- Benefits
  - Makes learning new systems easier
  - Helps users understand the underlying conceptual model
  - Can be very innovative and enable the applications to be made more accessible to a greater diversity of users

Example Metaphors: Vampire Mirrors and Privacy Lamps





- metaphor for privacy of inform.

- Intuitive physical Metaphor
- Several obj. under one lamp
- Height of lamp det. Area of light
- works also inversely (publicity lamp)

Problems with Interface Metaphors

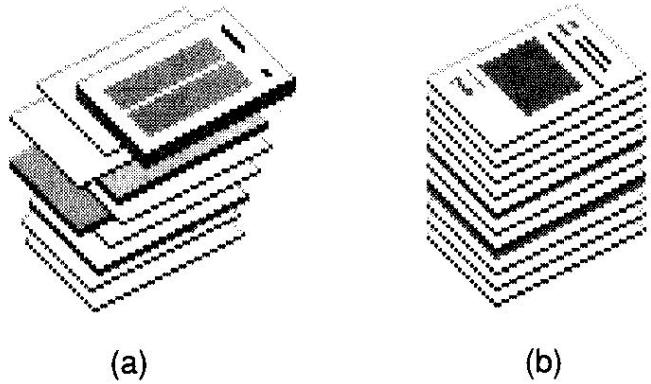
- Sometimes break conventional and cultural rules
  - e.g. recycle bin placed on desktop
- Can constrain designers in the way they conceptualize a problem space
- Can conflict with design principles
- Forces users to only understand the system in terms of the metaphor
- Designers can inadvertently use bad existing designs and transfer the bad parts over
- Limits designers' imagination in coming up with new conceptual models

Data Mountain

(Robertson, UIST'98, Microsoft)

„Pile“ metaphor

(Mander et al., CHI’92, Apple)



(a) (b)

Figure 1. Piles on the desktop. In general, piles can contain various media, such as folders and individual documents. The pile in (a) was created by the user, and is consequently disheveled in appearance. In addition, the system can create piles for the user, based on rules explicitly stated by the user or developed through user-system collaboration. These piles have a neat appearance, as shown in (b), to indicate that there is a script, or set of rules, behind them.

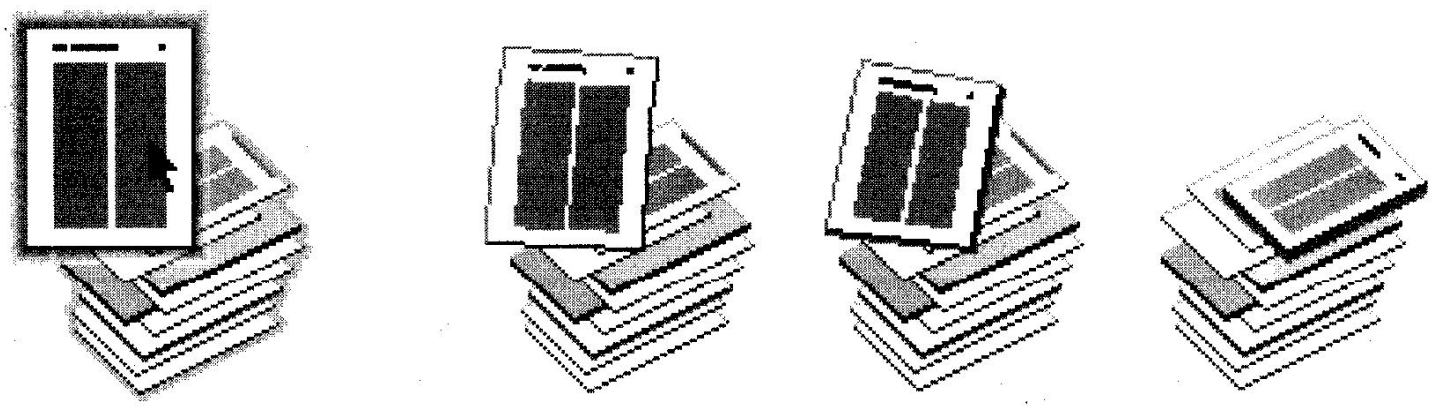
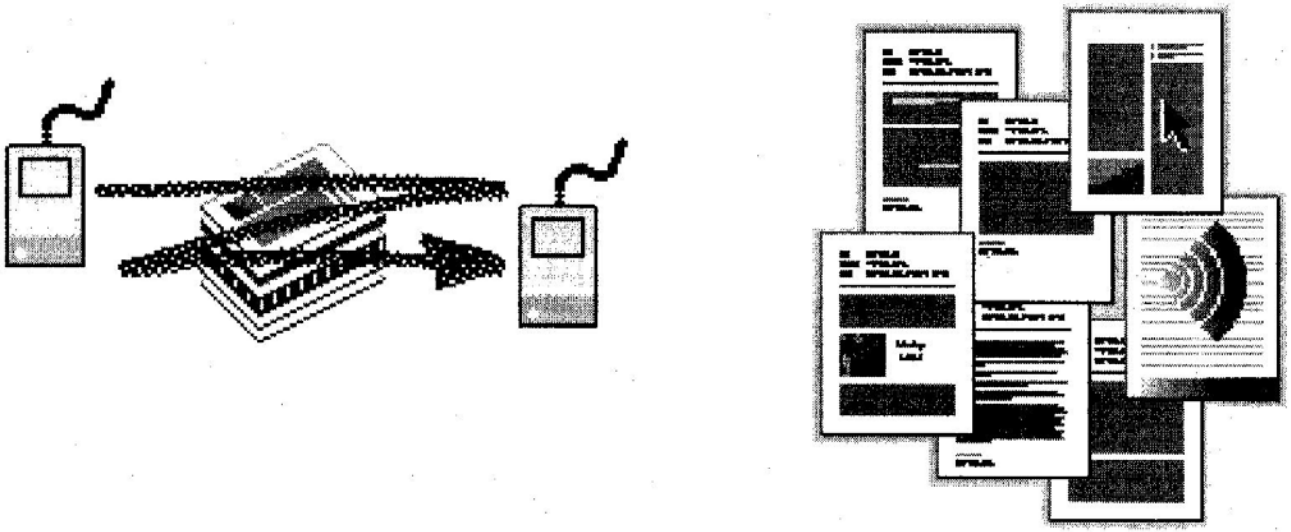
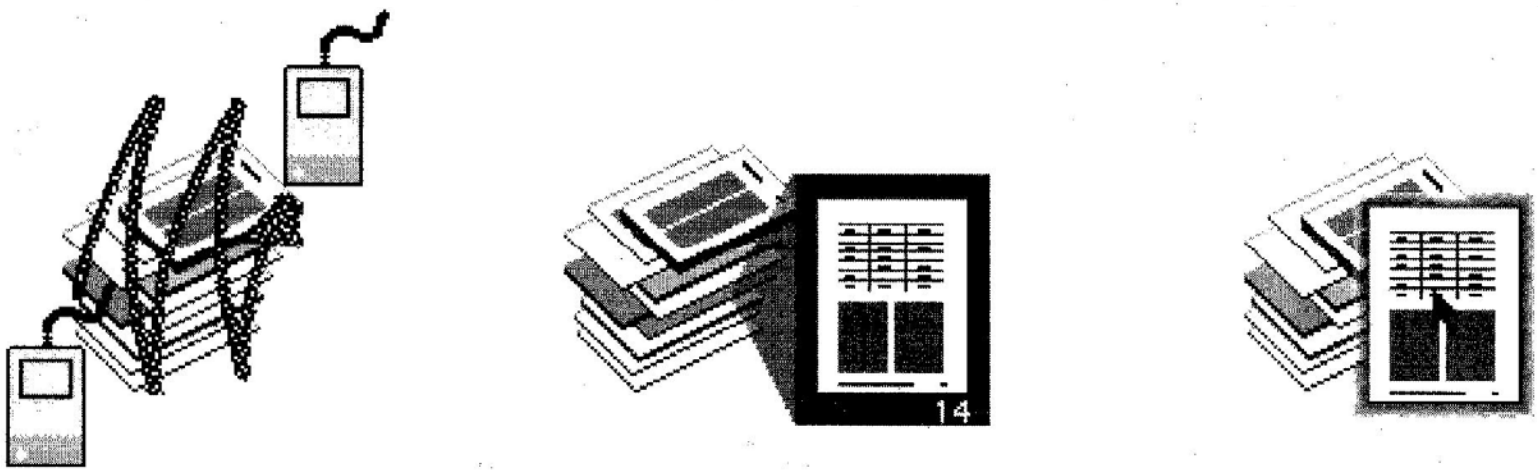


Figure 2. Adding a document to a pile. If a document is positioned over an existing pile, the pile highlights to show that it can accept the new document. When the mouse button is released the document ‘drops’ onto the pile.



(a) (b)

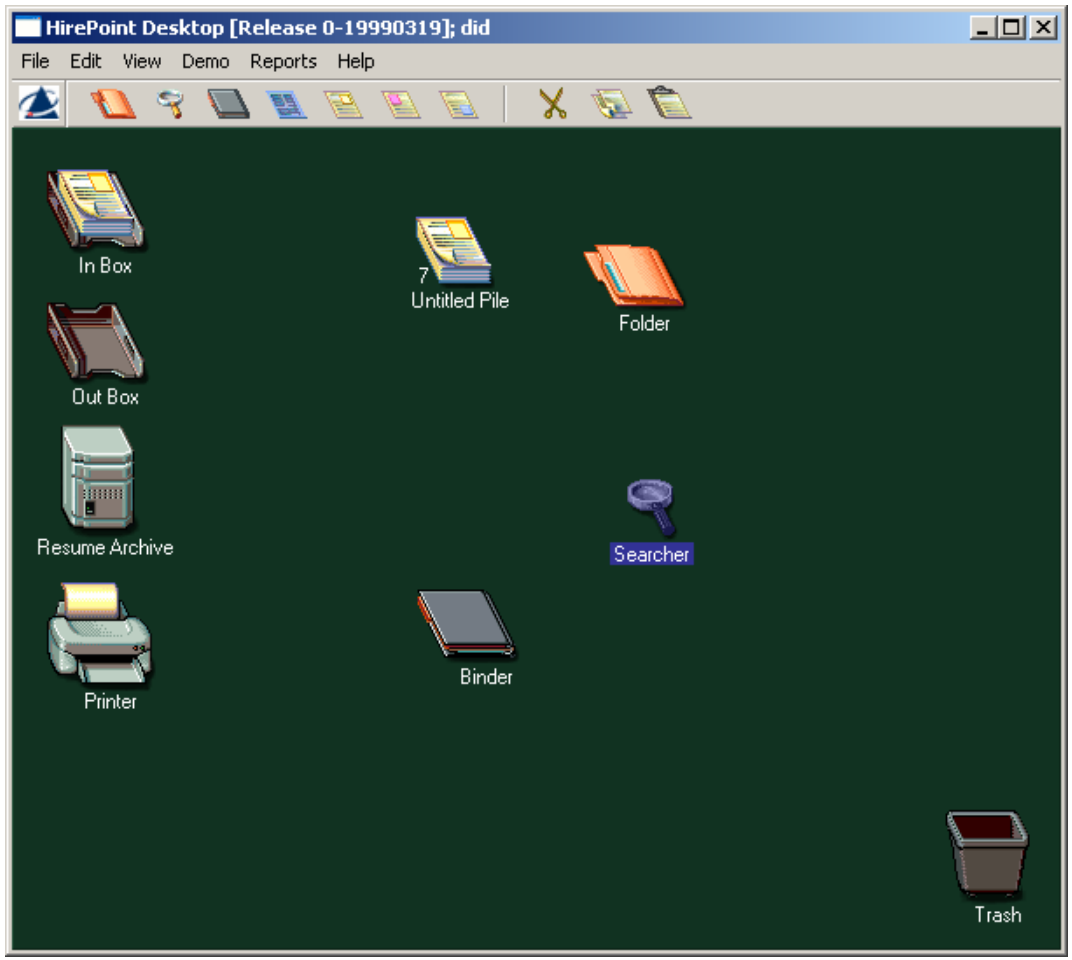
Figure 4. Browsing by spreading out a pile. Gesturing sideways with the mouse pointer, or with a finger in the case of a touch screen, causes the pile contents to spread out. Individual items can now be directly manipulated.



(a) (b) (c)

Figure 5. Browsing while maintaining the pile's structure. Gesturing vertically with the mouse pointer as shown in (a), or with a finger in the case of a touch screen, generates a 'viewing cone' (b) that contains a minature version of the first page of the item under the pointer. This viewing cone will follow the vertical position of the pointer; the miniature changes as the pointer moves over each item. The user can move through the pages of an item in the viewing cone by using the left and right cursor keys on the keyboard. When an item is visible in the viewing cone, it can be selected by clicking the mouse button. The item then appears next to the pile on the desktop, as shown in (c).

Demo: HirePoint interface
(Copyright by Brad Paley, www.didi.com)



Interaction Mode vs. Interaction Style

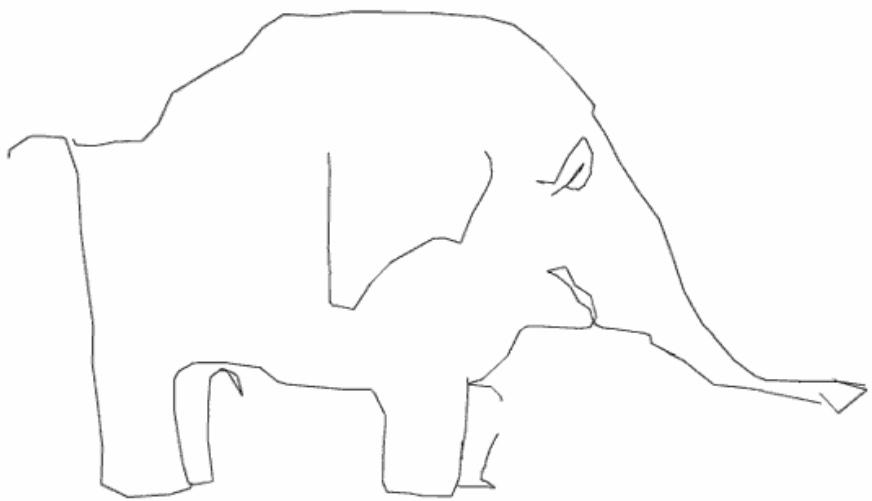
- Interaction mode:
  - what the user is doing when interacting with a system, e.g. instructing, talking, browsing or other
- Interaction style:
  - the kind of interface used to support the mode
  - E.g. Command, Speech, Data-entry, Form fill-in, Query, Graphical, Web, Pen, Augmented reality, Gesture

Many kinds of interaction styles available…

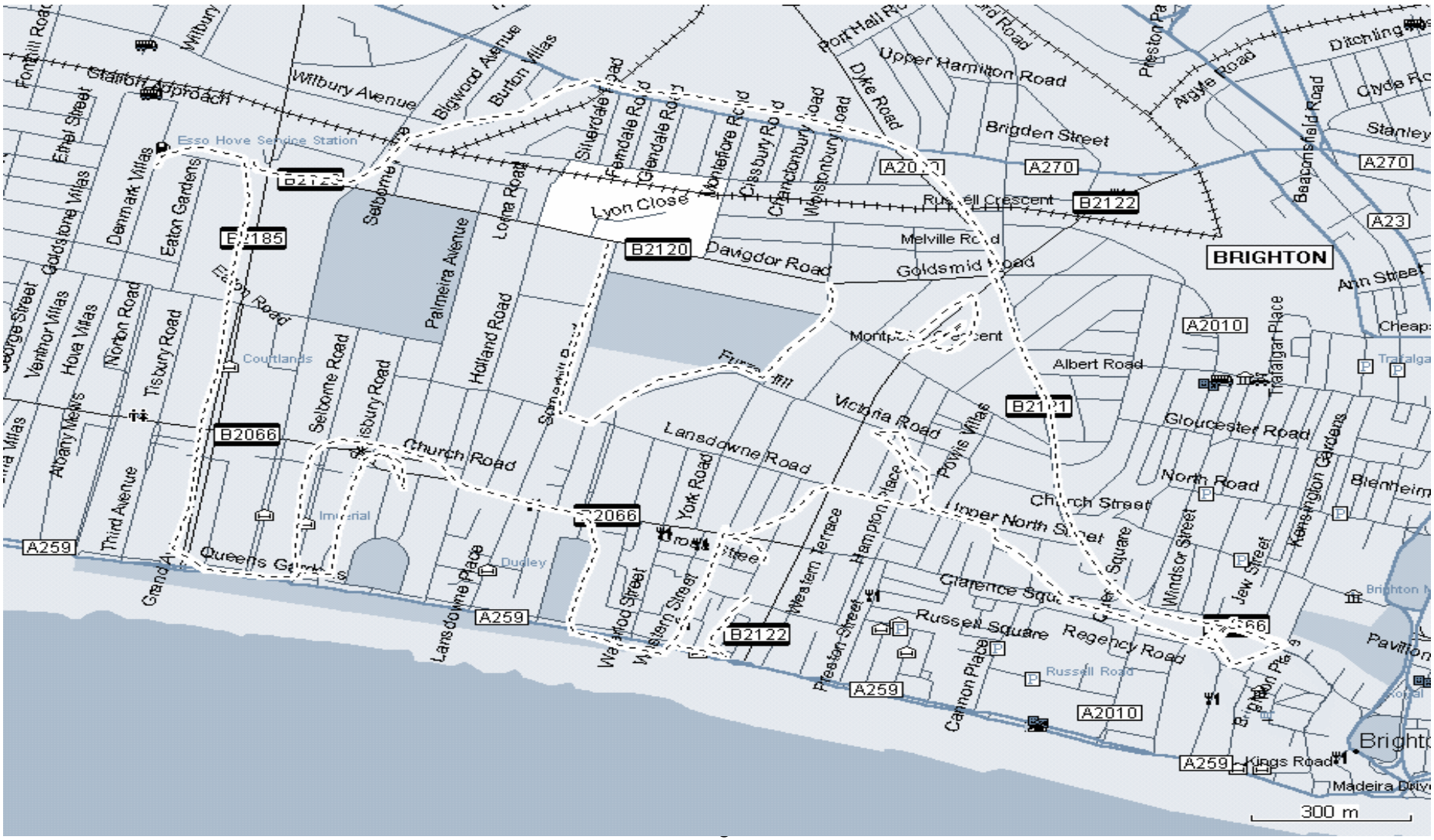
- Command
- Speech
- Data-entry
- Form fill-in
- Query
- Graphical
- Web
- Pen
- Augmented reality
- Gesture and even...

Interacting via GPS and cell phone…

- Drawing an elephant by walking round the streets of a city (or other mode of transport) and entering data points along the way via the cell phone
- Example: Brighton and Hove(UK) by J. Wood by foot, track length 11.2km (see www.gpsdrawing.com for more examples)



Making art by recording where walking in a city

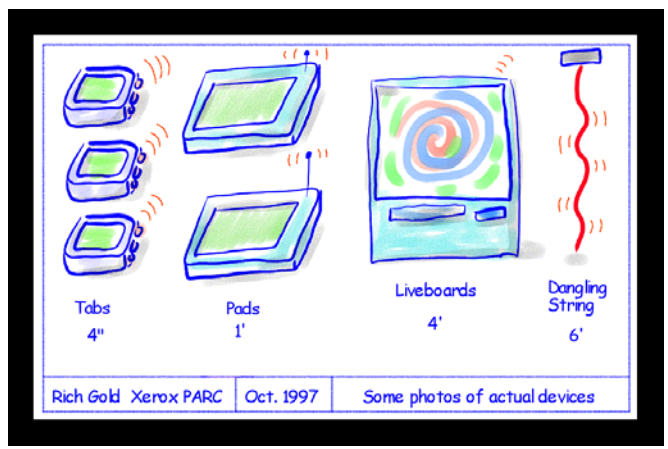


Interaction paradigms

- “a particular philosophy or way of thinking about interaction design” Preece, Rogers & Sharp, 2002, Interaction Design, Wiley, p60

- Past: The Desktop – intended for single user sitting in front of standard PC
- Present: “Beyond the Desktop”

- Alternative interaction paradigms
  - Ubiquitous computing
  - Pervasive computing
  - Wearable computing
  - Augmented reality
  - Tangible bits



References

- B. Shneiderman. Designing the User Interface: Strategies for Effective Human-Computer Interaction , Third Edition. 1997. ISBN: 0201694972
- A. Cooper. About Face 2.0
- Preece, Rogers, Sharp. Interaction Design: Beyond Human-Computer. John Wiley & Sons; 1 edition, 2002
  ISBN: 0471492787 http://www.wiley.co.uk/interactiondesign/sample.html
- Selected Slides from http://www.id-book.com/

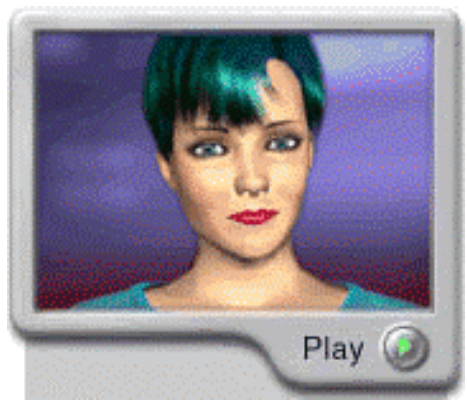
Understanding how interfaces affect users

(Preece, Rogers & Sharp, chapter 5)

Overview

- Expressive interfaces
  - how the ‘appearance’ of an interface can elicit positive responses

- Negative aspects
  - how computers frustrate users
- Anthropomorphism and interface agents
  - The pros and cons



- Designing synthetic characters

Affective aspects

- HCI has generally been about designing efficient and effective systems
- Recently, move towards considering how to design interactive systems to make people respond in certain ways
  - e.g. to be happy, to be trusting, to learn, to be motivated

Expressive interfaces

- Colour, icons, sounds, graphical elements and animations are used to make the ‘look and feel’ of an interface appealing
  - Conveys an emotional state

- In turn this can affect the usability of an interface
  - People are prepared to put up with certain aspects of an interface (e.g. slow download rate) if the end result is very appealing and aesthetic


Friendly interfaces

- Microsoft pioneered friendly interfaces for technophobes - ‘At home with Bob’ software
- 3D metaphors based on familiar places (e.g. living rooms)
- Agents in the guise of pets (e.g. bunny, dog) were included to talk to the user
  - Make users feel more at ease and comfortable
- http://home.pmt.org/~drose/aw-win3x-17.html

User-created expressiveness

- Users have created *emoticons* - compensate for lack of expressiveness in text communication:

  Happy :) Sad :< Sick :X

  Mad >: Very angry >:-(

- Chatroom abbreviations

  ASAP, AFAIK, IMHO, LOL, ROFL, …

- Use of icons and shorthand in text and instant messaging also has emotional connotations, e.g.

  I 12 CU 2NITE

User frustration

- Many causes:
  - When an application doesn't work properly or crashes
  - When a system doesn't do what the user wants it to do
  - When a user's expectations are not met
  - When a system does not provide sufficient information to enable the user to know what to do
  - When error messages pop up that are vague, obtuse or condemning
  - When the appearance of an interface is garish, noisy, gimmicky or patronizing

Error messages

"The application Word Wonder has unexpectedly quit due to a type 2 error."

Why not instead:

"the application has *expectedly* quit due to poor coding in the operating system"

- Shneiderman's guidelines for error messages include:
  - avoid using terms like FATAL, INVALID, BAD
  - Audio warnings
  - Avoid UPPERCASE and long code numbers
  - Messages should be precise rather than vague
  - Provide context-sensitive help

Website error message…

Error 404 – Web Page Not Found

More helpful error message

“The requested page **/helpme** is not available on the web server.

If you followed a link or bookmark to get to this page, please let us know, so that we can fix the problem. Please include the URL of the referring page as well as the URL of the missing page.

Otherwise check that you have typed the address of the web page correctly.”

Should computers say they're sorry?

- Reeves and Nass (1996) argue that computers should be made to apologize
- Should emulate human etiquette
- Would users be as forgiving of computers saying sorry as people are of each other when saying sorry?
- How sincere would they think the computer was being? For example, after a system crash:
  - "I'm really sorry I crashed. I'll try not to do it again"
- How else should computers communicate with users?

Anthropomorphism

- Attributing human-like qualities to inanimate objects (e.g. cars, computers)
- Well known phenomenon in advertising
  - Dancing butter, drinks, breakfast cereals
- Much exploited in human-computer interaction
  - Make user experience more enjoyable, more motivating, make people feel at ease, reduce anxiety

Which do you prefer?

1. As a welcome message

- “Hello Chris! Nice to see you again. Welcome back. Now what were we doing last time? Oh yes, exercise 5. Let’s start again.”

- “User 24, commence exercise 5.”

Which do you prefer?

2. Feedback when get something wrong

1. “Now Chris, that’s not right. You can do better than that. Try again.”

2. “Incorrect. Try again.”

   Is there a difference as to what you prefer depending on type of message? Why?

Evidence to support anthropomorphism

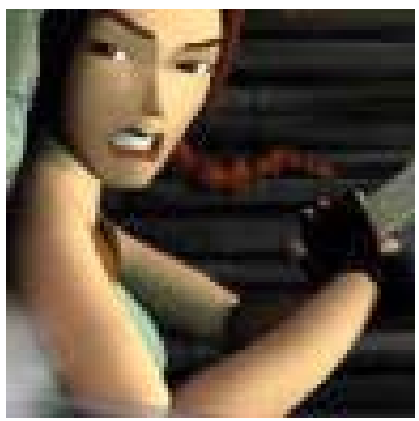
- Reeves and Nass (1996) found that computers that flatter and praise users in education software programs -> positive impact on them
- "Your question makes an important and useful distinction. Great job!"
- Students were more willing to continue with exercises with this kind of feedback

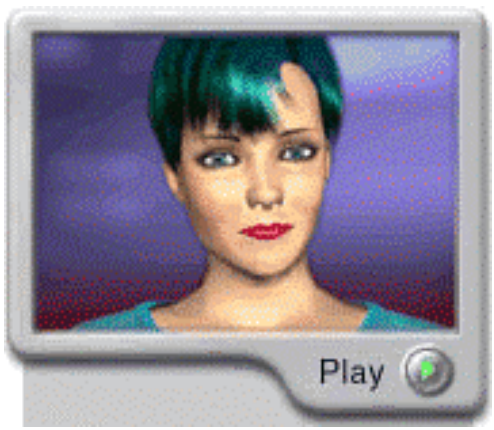
Criticism of anthropomorphism

- Deceptive, make people feel anxious, inferior or stupid
- People tend not to like screen characters that wave their fingers at the user & say:
  - "Now Chris, that's not right. You can do better than that. Try again."
- Many prefer the more impersonal:
  - "Incorrect. Try again."
- Studies have shown that personalized feedback is considered to be less honest and makes users feel less responsible for their actions (e.g. Quintanar, 1982)

Virtual characters

- Increasingly appearing on our screens
  - Web, characters in videogames, learning companions, wizards, newsreaders, popstars
- Provides a persona that is welcoming, has personality and makes user feel involved with them





Disadvantages

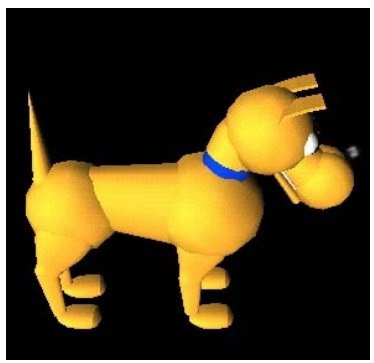
- Lead people into false sense of belief, enticing them to confide personal secrets with chatterbots (e.g. Alice)
- Annoying and frustrating
  - E.g. Clippy
- Not trustworthy
  - virtual e-commerce assistants?

Virtual characters: agents

- Can be classified in terms of the degree of anthropomorphism they exhibit:
  - Synthetic characters
  - animated agents
  - emotional agents
  - embodied conversational agents

(i)Synthetic characters -Silas the dog

- autonomous, with internal states and able to respond to external events



(Blumberg, 1996 - MIT)

Next week‘s lecture: Guest lecture by Marc Böhlen

- **Machines for Supermodernity**
- Dienstag 14.12.04, 12:15 Uhr (=12 c.t.)
- LMU Hauptgebäude, Raum 129 / M010
- Abstract at www.mimuc.de